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ABSTRACT

This study investigates similarities and differences in the interactions of infants with mothers and fathers, and examines the structural characteristics of social interaction between infants and fathers. Data are based on analyses of videotapes showing face-to-face interaction of five healthy first born infants with their mothers and fathers. The interaction of infants with fathers as well as mothers is a reciprocal and jointly regulated process. Differences between mother-infant and father-infant interaction exist in the quality of regulation and in the temporal structure and content of games parents and infants play. Mothers and infants engaged in more verbal play while fathers and infants played more rhythmic tapping games. These differences provide the anlage for different functional tracks of development and together foster the development of a wider range of social skills than if only one pattern were available. (Author/MS)

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THE GOALS AND STRUCTURE OF FACE-TO-FACE INTERACTION BETWEEN INFANTS AND FATHERS

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Abstract

This study demonstrates both similarities and differences found during videotaped face-to-face mother-infant and father-infant interaction. The interaction of infants with fathers as well as mothers is a reciprocal and jointly regulated process. Differences between mother-infant and father-infant interaction exist in the quality of regulation and in the temporal structure and content of games parents and infants play. Mothers and infants engaged in more verbal play while fathers and infants played more rhythmic tapping games. These differences provide the anlage for different functional tracks of development and together foster the development of a wider range of social skills than if only one pattern were available.

The Goals and Structure of Face-to-Face Interaction Between Infants and Fathers

Although fathers are increasingly involved with their young infants, we still know very little about the nature of the father-infant relationship. Our work over the past few years represents an attempt to understand father-infant interaction. In addition, by observing infant interactions with fathers as well as mothers, we hope to gain a clearer understanding of the social skills of young infants and of the broader social environment in which they develop.

Videotaped face-to-face interactions in the laboratory provide a window through which we can see exchanges of expressive communication that we believe underlie the developing father-infant relationship. (Brazelton, Koslowski and Main, 1974; Brazelton, Tronick, Adamson, Als and Wise, 1975).

Our previous work has provided a detailed behavioral description of these interactions during the first six months of life (Yogman, et al., 1977). We have demonstrated in an interactive situation that infants discriminate familiar adults, mother and father, from each other and that they frown significantly less with both parents than with strangers as early as the first month of life.

In this discussion, I will analyze the structural characteristics of social interaction between infants and fathers. Our data suggest that the interaction of young infants with fathers as well as mothers is a reciprocal and jointly regulated process in which both partners modify their actions in response to the feedback provided by their partner.

After discussing similarities in the interactions of infants with fathers and mothers, I will then comment on differences both in the quality of regulation and in the structure and content of games parents play with their infants.

The data are based on slow motion analyses of videotapes from the interactions of five healthy, first-born infants with their mothers and fathers. Infants also interacted with strangers, but these results are described separately (Dixon, 1977). All families were seen in our laboratory at biweekly intervals from the second week until the infants were six months old. All families were upper-middle class and mothers were the primary caretakers. The parent not being filmed waited outside the room. The laboratory was set up and videotapes were recorded and analyzed using a method of second by second description of expressive behaviors previously described (Yogman, et al., 1977; Brazelton, Tronick, Adamson, Als and Wise, 1975).

For the structural analysis, we segmented this continuous stream of behavior into a set of monadic phases made up by a set of substitutable second by second displays (Tronick, 1977). For both the infant and the adult these included the following monadic phases: Talk, Play, Set, Elicit, Monitor, Avert and Protest/Avoid.

Each session consisted of one two minute period of interaction with each adult, and the order of adults entering was counterbalanced across sessions and babies.

To provide the context for my discussion of our data analysis, I would now like to show you a film of one of our sessions - an interaction

between a three month old male infant and his mother and father. Both interactions are characterized by multiple positive affective interchanges which are mutually initiated and terminated.

First, we will see the segment of the infant with his mother. The interaction with mother begins as mother enters smiling and saying "hi" in a high-pitched voice. The baby responds with an early, but brief smile greeting after a latency of only three seconds. After about 30 seconds of mutural orientation, their interaction is characterized by phases of reciprocal vocalization or mutual talk, each lasting about four to eight seconds and interrupted by shorter three to four second pauses. These alternating dialogues consititute a verbal game for infant and mother, in which mother talks in a burst-pause manner and the infant vocalizes during the pauses. As mother and baby alternately build to a peak of attentional involvement and then decelerate repeating the sequence together, they illustrate the smoothly-modulated rhythmic cycling of mother-infant interaction.

— Film: Mother with Infant (96 days)

Next, we will see the episode of this infant with his father. Here, the father enters with a neutral facial expression and begins a narrative vocalization while the infant stills, sits upright and watches the father intently and quietly. The infant appears "set" to interact. After about six seconds, the infant then greets his father with a wide grin and punctuates this with a large, abrupt movement of his foot. Infant vocalizations are often laughs - short and intense - followed by long

pauses, while father imitates and amplifies his infant's facial expressions. Episodes of mutual play are followed by pauses in which the father becomes less animated - in other words, drops to set and waits for the infant to re-initiate the play. During the second minute, these episodes of play increase as the father touches the infant with rhythmic tapping patterns. This pattern is seen most clearly at the end of the session when the father walks his fingers up the baby's arm as part of a tapping game. This short burst of tapping is an example of the abrupt shifts that characterize father-infant interaction, in which father and infant alternately accelerate to higher peaks and decelerate to lower valleys than do mother and infant.

-- Film: Father with Infant (96 days)

I will now use our analysis of these two interactions to demonstrate both the similarities and differences between father-infant and mother-infant interaction we found in all five families. For each second of interaction, we translated specific descriptions of infant and adult behavior into one of the seven monadic phases described earlier.

Figure 1 depicts graphically the sequencing of the monadic phases for each of the participants during each second of interaction.

-- Figure 1 here

This figure shows the interaction of infant with the father we just saw on film. The figure shows that both father and infant cycle through similar phases shifting from set up to play and talk and then back down

to set again. We see that both father and infant spend more than 90% of the interaction in phases set, play and talk, the three most affectively positive phases.

Furthermore, the graph allows us to focus on the transitions between phases and to see that these transitions are jointly regulated. The small letters a through j below the graph mark transitions in which both partners move in the same direction within one to two seconds of each other. We can see that father and infant often change phases simultaneously during face-to-face interaction.

Figure 2 shows the similarities between father-infant interaction on the top and mother-infant interaction on the botton. Mother and

-- Figure 2 here

infant also cycle through similar affectively positive phases and on several occasions also change phases simultaneously as indicated by the small leters a through h directly below the graph. With both parents, the cycling between phases limits the duration of time spent in any one phase. With both mothers and fathers, this cycling appears to maintain the level of affective involvement of each partner within certain limits in a homeostatic fashion.

Below each of the graphs is another visual representation of the amount of meshing or mutual regulation which occurs during these dyadic interactions. During each second, parent and infant monadic phases may be related in one of three ways: match, conjoint and disjoint.

1. First, their phases may be identical and we have called this a "match."
2. Second, both partners may be in adjacent phases as when the adult is in play and the infant is in talk. We have called this "conjoint".
3. Third, the partners may be more than one phase apart as when the adult is in elicit and the infant is in play. We have called this "disjoint".

The shaded boxes below the graphs depict the relationship between infant and parent phases during each second as match on top, conjoint in the middle and disjoint on the bottom. After a few seconds of disjoint states, the remainder of infant interaction with both parents consists of conjoint and match states.

Next, we looked more closely at similarities in dyadic states - match, conjoint and disjoint. Figure 3 shows more clearly the relative proportion of time spent in each of these three dyadic states during infant interaction

-------- Figure 3 here ----------

with mother and father. The area of the boxes represents the proportion of time spent in each state. The arrows between or within states represent the transitions between states for each second of the interaction. As you can see, interactions are mostly conjoint with both parents: 56% of the time with mother and 60% of the time with father . There are also a large proportion of matching states with both parents while disjoint states are rare, occuring less than 10% of the time. Furthermore, the

transitions between dyadic states demonstrate the way partners achieve this meshing. Most of the second to second transitions either remain within conjoint or match states or cycle between the two. When the partners diverge to disjoint states, they readjust back to conjoint or match states within the next one or two transitions. These data all suggest similarities in joint regulation and reciprocity displayed during dyadic interactions of infants with mothers and fathers. Similarities exist in the levels of affective involvement of the partners, the almost simultaneous timing of transitions between phases present during interactions with both parents, and in the quality of dyadic states and nature of transitions between dyadic states.

I'd now like to discuss some differences between father-infant and mother-infant interaction. These differences exist in the sequencing of phases, and in the temporal structure and behavioral content of the play and talk phases.

If we focus just on episodes of infant talk in Figure 2 and look at the transitions the infant makes from that phase to other phases, differences between infant interaction with mothers and fathers become apparent. We have characterized two different types of transitions from the phase of infant talk. Transition A represents a shift from talk to a lower phase and then back up to talk on the subsequent transition. An example can be seen on the infant-mother graph between the small letters b and c (Figure 2). Transition B represents the same initial shift from talk to a lower phase, but then a subsequent shift to a phase other than talk instead of back to talk. An example can be seen on the infant-father

graph between the small letters b and c (Figure 2). The bar graphs on Figure 4 show the relative proportion of infant transitions A (left) and B (right) occuring during mother-infant and father-infant interaction.

------- Figure 4 here -------

With mothers, transitions are more likely to be Type A, while with fathers these transitions are more likely to be Type B. Furthermore, the mean duration of the interval between episodes of talk is also longer with fathers (8.0 sec.) than with mothers (2.8 sec.). These data suggest that after infants talk with fathers, they are more likely to shift through lower phases and remain there for a longer time, while with mothers they are more likely to return to talk. This difference in the quality of transitions between phases is characterisitic of the more accentuated shifts from peaks of maximal attention to valleys of minimal attention that occur during infant interaction with fathers. This can be compared with the more gradual and modulated shifts that occur during mother-infant interaction.

Futher differences are evident in the temporal structure and specific behavioral content of dyadic phases such as mutual talk or mutual play. We have called these two dyadic phases interactive "games" in the same sense that Dan Stern (1974) has defined them: "A series of episodes of mutual attention in which the adult uses a repeating set of behaviors with only minor variations during each episode of mutual attention."

We looked specifically at verbal games such as the play dialogue we saw on the film with mother and at tapping games such as the one at the end of the father-infant session. We classified a game as verbal when

both adult and infant were in the phase talk. We classified a tapping game when the infant was either in phase play or talk, while the adult was in the phase play and touched the infant with a tapping pattern. The bar graphs on Figure 5 show that mother and infant spent more time playing verbal games while father and infant spent more time playing tapping games.

------- Figure 5 here ------

Even more meaningful than these differences in amount of time were the differences in temporal structure and interactive quality of the games infants played with mothers and fathers. Stern (1977) has discussed the effects of temporal shifts on increasing the infant's attention and arousal. One may speculate about the differential effects of a vocalization-pause-vocalization game as compared with a repetitive tapping game with more widely spaced pauses. I'd like to show you a few segments of film from other sessions of infants with fathers to illustrate the quality of these games fathers and infants engage in.

The first segment shows the same father-infant pair you saw a few minutes ago when the baby was only 45 days old. Notice the mutual imitation of mouth position by infant and father as father exercises his infant in a "pull to sit" game.

------ Film - Father with Infant (45 days) ---

We see the beginnings of these games between fathers and infants in the first few weeks. In this next segment, we'll see a female infant who is only 23 days old and yet smiles responsively to the three-point tapping game the father initiates.

---- Film - Father with Infant (23 days) -----

The final segment shows a father with a two month old female infant playing a game he calls "button your lip." Notice how the baby responds: her face softens, she builds to a smile, and she opens her mouth and coos in anticipation of father's next tap. As he restarts a cycle, she laughs and punctuates these episodes with movements of her feet.

--- Film: Father with Infant (64 days) ---

Differences between mother-infant and father-infant interaction can be seen in all five families both in the quality of transitions between phases and in the content of games played. They suggest that at least for these five families interactions with fathers can be characterized as heightened and playful while the interactions with mothers appeared more smoothly modulated and contained.

In summary then, both similarities and differences exist between these mother-infant and father-infant interactions. At a structural level, dyadic interaction with both mothers and fathers appears mutually regulated and in both cases, partners build to a peak of attentional involvement and come down in an orderly and cyclical fashion. Furthermore, infants exhibit well-organized expressive displays that are affectively positive with both parents. We believe that through these mutually regulated reciprocal exchanges, both prents provide a responsive, protective environment that matches the infant's developmental capacities.

Along with these structural similarities, we have illustrated differences in the temporal structure and content of play which we believe provide the anlage for different functional tracks of development. The establishment and development of rules of interchange during play dialogues

provide the foundation for later language development. Tapping games with their different temporal structure and different modulation of infant arousal differentiate into alternate forms of social play which eventually incorporate objects and lead into further instrumental activities. Both types of play offer the infant the opportunity to participate in "turn-taking" activities, through which the infant develops early notions of sharing control in an interactive situation. Through play, the infant learns the rules of culture and of family (Bruner, 1976).

We believe that each of these differential tracks serves a unique function in the infant's development. Together, they foster the development of a wider range of social skills than if only one pattern were available. Both of these tracks seem available to infants as early as one month of age and both depend on the parent's ongoing relationship with their infant. This relationship allows both parents to be aware of the physiological and psychological capabilities of their infant and in turn, to both support and test the limits of those capabilities.

In closing, I think that studies of face-to-face interaction allow us to see what parents have known all along - namely, that fathers have a unique, important and direct role to play with young infants, a role that complements the relationship with the mother, and a role that starts at birth. The recognition by fathers as well as mothers of their special roles fosters the attachment of both parents to their infant, enhances their involvement with their infant, and, in turn, strengthens the family.

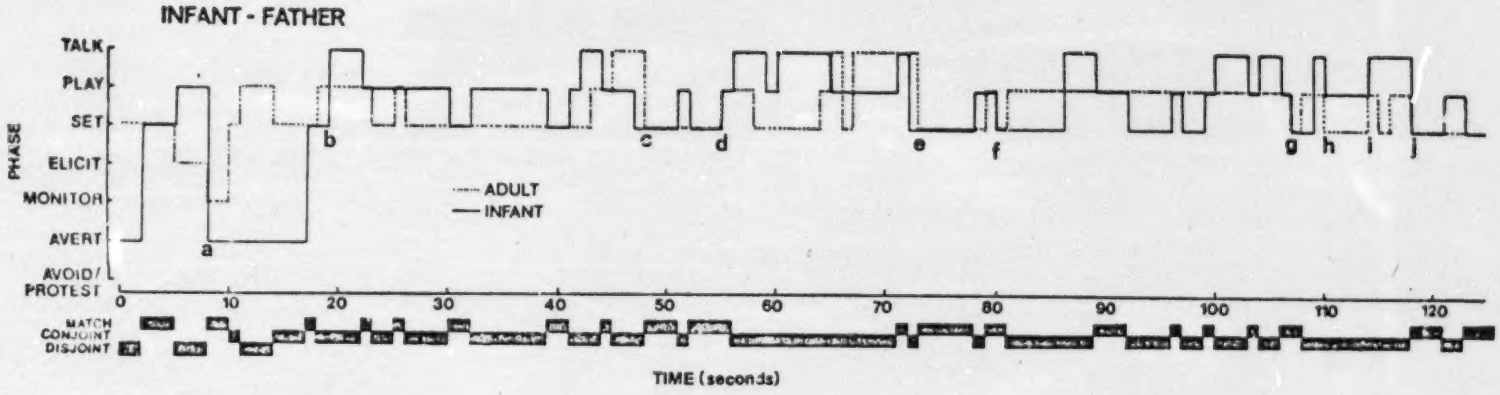


Figure 1: Father-Infant (96 days) Interaction

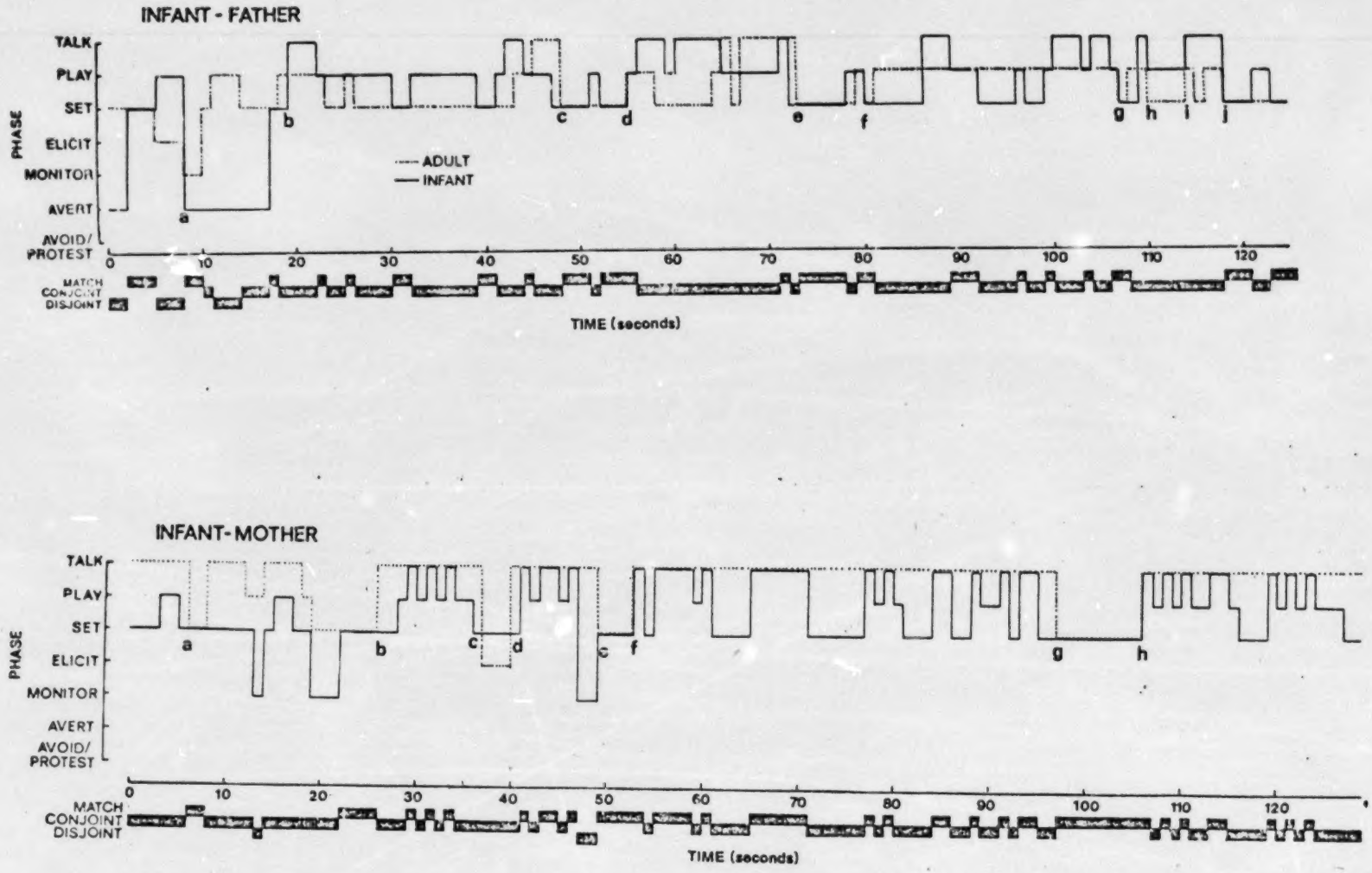
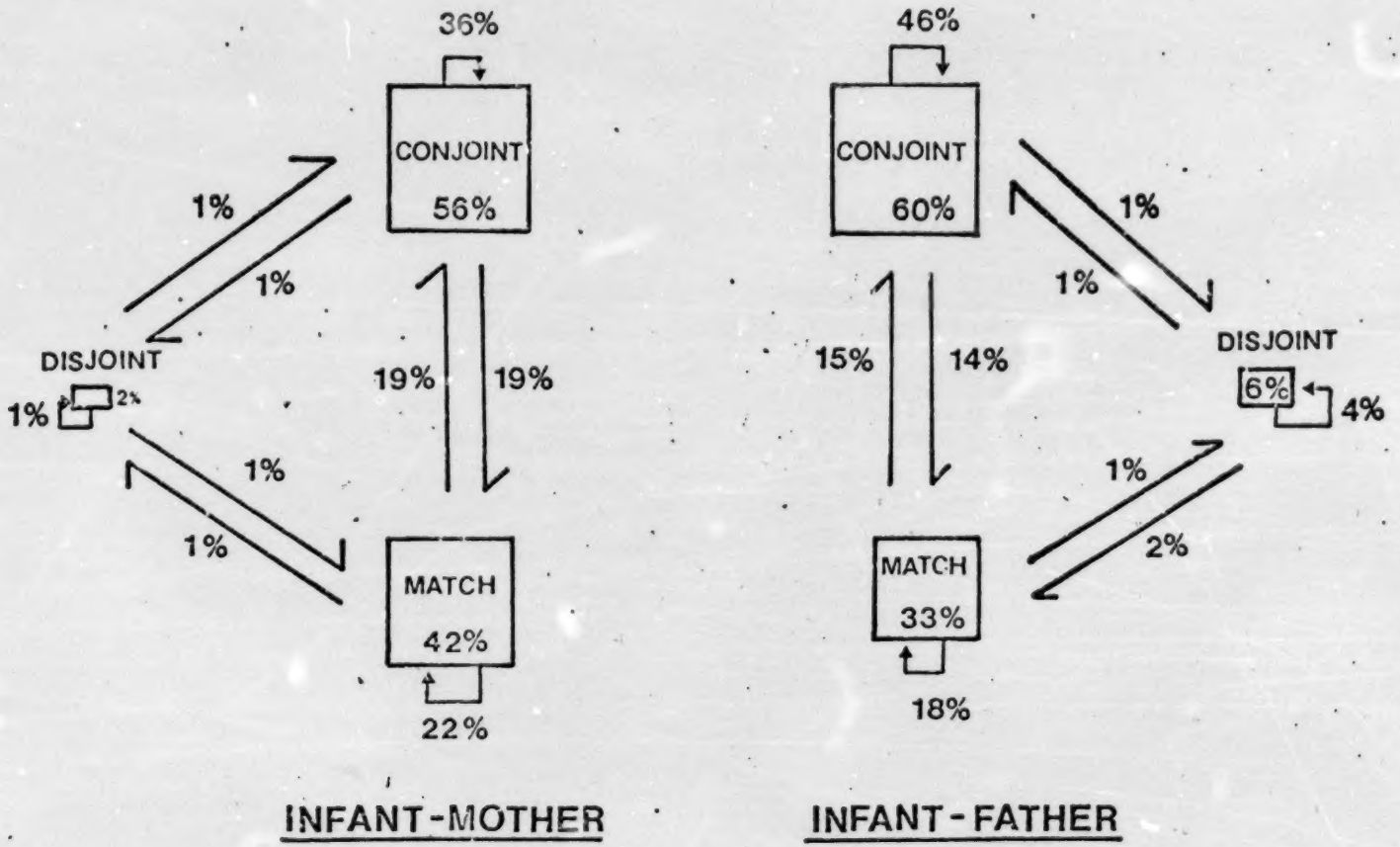


Figure 2: Father-Infant (96 days) and Mother-Infant (96 days) Interaction

Figure 3: QUALITY AND TRANSITIONS BETWEEN DYADIC STATES



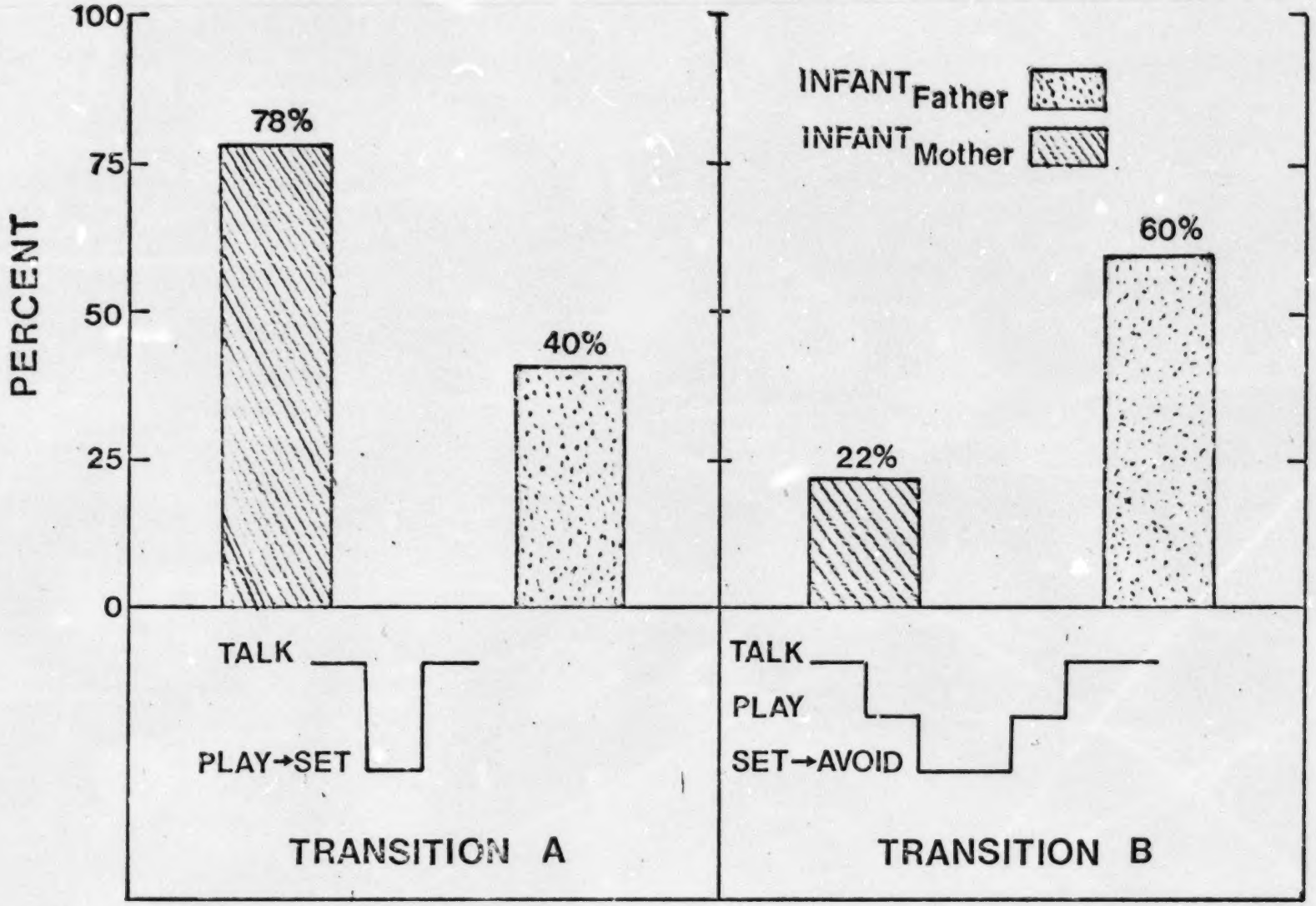


Figure 4: Transitions From Infant Talk

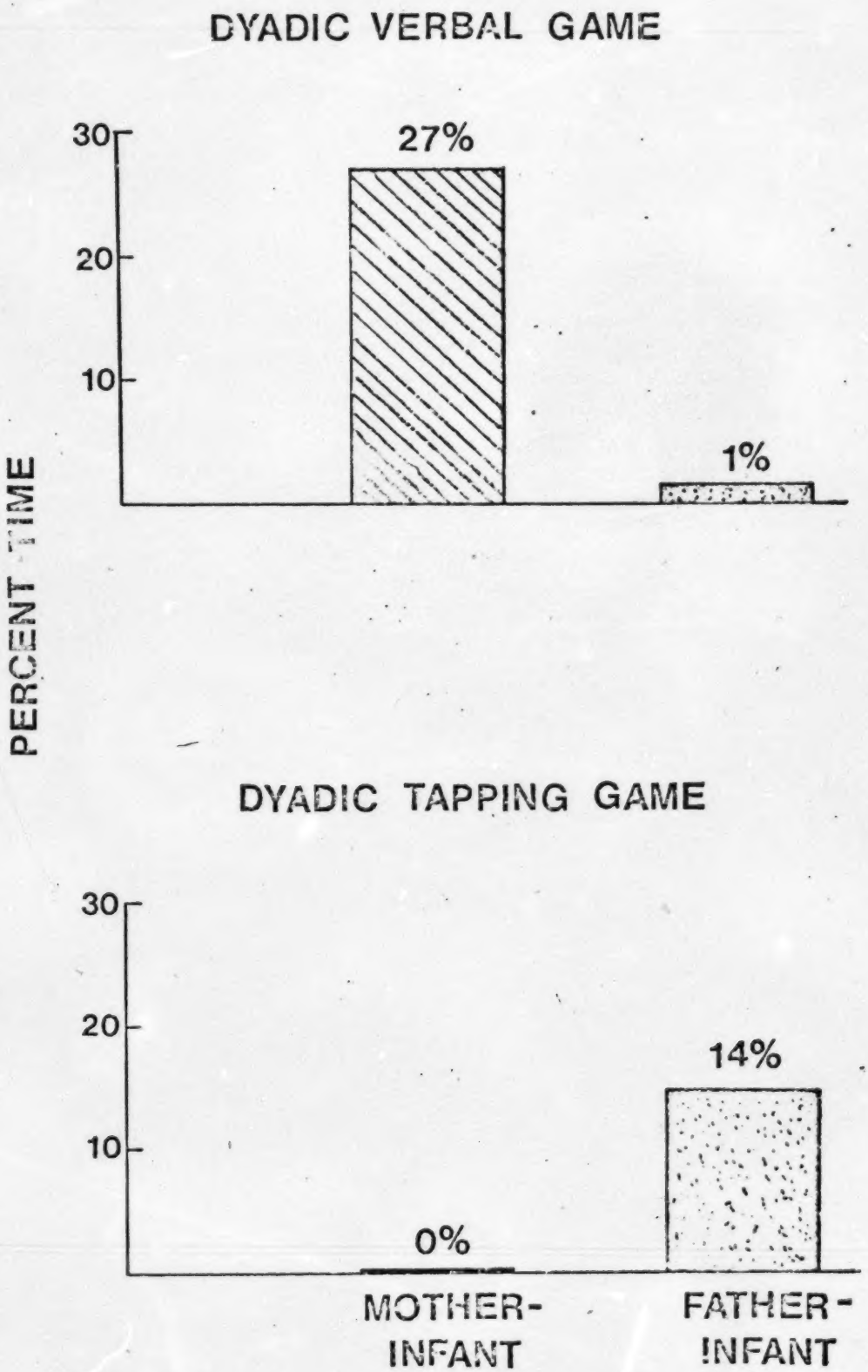


Figure 5: Dyadic Games

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